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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/502,034	07/19/2004	Christian Peter Behrenbruch	13615PCTUS	8699
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EXAMINER LEE, JOHN W				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/502,034

Applicant(s)

BEHRENBURCH ET AL.

Examiner

JOHN Wahnkyo LEE

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
4a) Of the above claim(s) 2 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1, 3-10 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/22)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

DETAILED ACTION

- The examiner acknowledges that the notice of non-compliant sent out on 28 January 2009 was an error, and this office action is responding to the applicant's arguments filed on 31 October 2008.

Response to Arguments/Amendments

1. Applicant's arguments filed on 31 October 2009 have been fully considered.
2. Applicant's argument, with respect to claims 1, 3-4, 7-10, 13 and 17-20 under 35 U.S.C. 102 (e), has been considered, but is not persuasive.

The applicant argues that Avinash fails to disclose at least "calculating a measure of a local confidence in the registration of the two images with each other," "displaying said measure of local confidence in the registration of the two image with each other", "the measure of local confidence is calculated from the degree of transformation required to perform said mapping." However, the examiner does not agree with the applicant. Avinash does disclose Regarding claim 1, Avinash discloses a method of displaying (Fig. 2-29; paragraph [0018], "a monitor and user interface") two images (paragraph [0022], "two x-ray images, S1 and S2") in registration (Fig. 3-46, paragraph [0024], "registration mode") with each other comprising the steps of comparing (Fig. 3-50, paragraphs [0027]-[0030], "comparison mode") the two images (paragraph [0022], "two x-ray images, S1 and S2") to each other, calculating a transformation (paragraph [0024], "rigid body registration transformations" and "elastic transformations") which maps features in one image to corresponding features in the

other (paragraph [0024], "translation, rotation, magnification and shearing ... pair of images from t_1 and t_2 "), displaying the two images in superimposition based on the transformation (paragraph [0032], "second display unit" and "superposition of S_{1-2} onto S_1 or S_2 "), calculating a measure of a local confidence in the registration of the two images with each other (paragraphs [0027]-[0030], "comparison mode" and "dissimilarity measure"), wherein said measure of confidence is calculated from the degree of transformation (paragraph [0024], "rigid body registration transformations" and "elastic transformations") required to perform said mapping, and displaying said measure of the local confidence in the registration of the two images with each other (paragraph [0032], "second display unit" and "superposition of S_{1-2} onto S_1 or S_2 ").

The examiner appreciates the applicant trying to explain the difference between Avinash's dissimilarity measure and applicant's local confidence measurement with several examples. However, the claims do not recite any specifics which the applicant considers as differences comparing with Avinash's invention. No where in the claims recite that the confidence measure is a measure of how much it was necessary to distort or transform an image in order to achieve registration, i.e., pre-registration. Moreover, the claims do not recite each step of the claim limitations being done sequentially. So, it does not matter whether the prior art was discloses a post-registration method, while the applicant's invention is about pre-registration. If the applicant wanted the claims disclosing about pre-registration, there should have been a claim limitation(s) or a phrase that shows the steps were done in a certain order.

Therefore, the rejection to claims 1, 3-4, 7-10, 13 and 17-20 cannot be withdrawn.

3. Applicant's arguments, with respect to claims 5-6, 11-12 and 14-16 under 35 U.S.C. 103 (a), have been considered, but is not persuasive.

As discussed above, Avinash does disclose all the claim limitations of claim 1. So, the dependent claims 5-6, 11-12 and 14-16 cannot allowed for at least the reasons set forth above.

Regarding claim 5, Avinash and O'Donnell are combinable and proper. Those two reference are pertinent the area of medical image processing. "Deriving a confidence weight such as the deformation magnitude in a region about the pixel as a predictor of the correlation magnitude" of O'Donnell does read on "measure of confidence being calculated from the magnitude of the local deformation in said transformation," which is broad.

Regarding claim 6, the details of the applicant and Shi might be different, however, the claim is broad enough that "constructing a match confidence weighted regularization function to compute dense field motion for all surface points based on LV surface point determined by the local shape between successive surface frames" of Shi reads on "measure of confidence being calculated from the local change of volume implied by the transformation."

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3-4, 7-10, 13, and 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Avinash et al. (US 2004/0017935).

Regarding claim 1, Avinash discloses a method of displaying (Fig. 2-29; paragraph [0018], "a monitor and user interface") two images (paragraph [0022], "two x-ray images, S1 and S2") in registration (Fig. 3-46, paragraph [0024], "registration mode") with each other comprising the steps of comparing (Fig. 3-50, paragraphs [0027]-[0030], "comparison mode") the two images (paragraph [0022], "two x-ray images, S1 and S2") to each other, calculating a transformation (paragraph [0024], "rigid body registration transformations" and "elastic transformations") which maps features in one image to corresponding features in the other (paragraph [0024], "translation, rotation, magnification and shearing ... pair of images from t1 and t2"), displaying the two images in superimposition based on the transformation (paragraph [0032], "second display unit" and "superposition of S₁₂ onto S1 or S2"), calculating a measure of a local confidence in the registration of the two images with each other (paragraphs [0027]-[0030], "comparison mode" and "dissimilarity measure"), wherein said measure of confidence is calculated from the degree of transformation (paragraph [0024], "rigid body registration transformations" and "elastic transformations") required to perform said mapping, and displaying said measure of the local confidence in the

registration of the two images with each other (paragraph [0032], "second display unit" and "superposition of $S_{1,2}$ onto S_1 or S_2 ").

Regarding claim 3, Avinash discloses said measure of confidence is calculated from the degree of non-rigid deformation in said calculated transformation (paragraphs [0027]-[0030]).

Regarding claim 4, Avinash discloses said measure is calculated excluding rigid motions (paragraphs [0027]-[0030]).

Regarding claim 7, Avinash discloses the measure being selectively displayed in response to user input (Fig. 2-28 and 29, paragraph [0039], "operator console" and "user interface").

Regarding claim 8, Avinash discloses the confidence measure being displayed overlaid on the two images (paragraph [0032], "second display unit" and "superposition of $S_{1,2}$ onto S_1 or S_2 ").

Regarding claim 9, Avinash discloses the measure being displayed as a visually distinguishable overlay on the two images, the visual properties of the overlay at any point being based on the said measure (paragraph [0032], "second display unit", "superposition of $S_{1,2}$ onto S_1 or S_2 ", and "multi-color overlay display").

Regarding claim 10, Avinash discloses the colour of the visually distinguishable overlay being varied in dependence on said measure ("using color look-up tables for the quantitative comparison of the overlaid images and the result combination being realized with a multi-color overlay display (page 3, paragraph [0032])").

Regarding claim 13, Avinash discloses the confidence measure being displayed next to the displayed superimposed images (paragraph [0032], "second display unit" and "superposition of S_{i+1} onto S_1 or S_2 ").

Regarding claim 17, Avinash discloses the images being medical images (paragraph [0022], "x-ray images"; paragraph [0033], "CT, x-ray, MRI, PED, ultrasound optical imaging...").

Regarding claim 18, Avinash discloses a computer-readable storage medium storing a computer program product (paragraph [0019], "software algorithms") comprising program code means for executing on a programmed computer (Fig. 2-43; paragraph [0018], "host computer") the method of claim 1, said computer program product stored on a computer-readable storage medium (Fig. 2-38, "mass storage").

Regarding claim 19, Avinash discloses a computer-readable storage medium storing a computer program (paragraph [0019], "software algorithms") comprising program code for executing on a programmed computer (Fig. 2-43; paragraph [0018], "host computer") the method of claim 1, said computer program stored on a computer-readable storage medium (Fig. 2-38, "mass storage").

Regarding claim 20, Avinash discloses an image display apparatus comprising a display (Fig. 2-43; paragraph [0018], "display"), and an image processor adapted to perform the method of claim 1 (Fig. 2-43; paragraph [0018], "host computer").

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avinash et al. (2004/0017935) in view of O'Donnell M et al. ("Strain magnitude estimation based on adaptive incompressibility processing").

Regarding claim 5, Avinash discloses all the claim limitations except the ones recited in claim 5. However, O'Donnell teaches measure of confidence being calculated from the magnitude of the local deformation in said transformation ("deriving a confidence weight such as the deformation magnitude in a region about the pixel as a predictor of the correlation magnitude (page 1645)").

Avinash and O'Donnell are combinable because both are pertinent to the area of medical image processing. By using the confidence weight such as the deformation magnitude of O'Donnell in Avinash's invention will add greater sensitivity and accuracy for the invention to yield high spatial resolution. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use O'Donnell's confidence weight in Avinash's invention to yield the predictable results of high spatial resolution.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avinash et al. (2004/0017935) in view of Shi P et al. ("Volumetric deformation analysis using mechanics-based data fusion: applications in cardiac motion recovery").

Regarding claim 6, Avinash discloses all previous claim limitations except the one recited in claim 6. However, Shi teaches measure of confidence being calculated from the local change of volume implied by the transformation ("constructing a match confidence weighted regularization function to compute dense field motion for all surface points based on LV surface point determined by the local shape between successive surface frames (page 92-93, chapter 2.1.3)").

Avinash and Shi are combinable because both are pertinent to the area of medical image processing. By using the confidence weighted regulation function of Shi in Avinash's invention will add greater sensitivity and accuracy for the invention to assess the goodness and the uniqueness of the matching choices. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Shi's confidence weighted regulation function in Avinash's invention to yield the predictable results of assessing the goodness and the uniqueness of the matching choices.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avinash et al. (2004/0017935) in view of Novak et al. (2002/0028006).

Regarding claim 11, Avinash discloses all previous claim limitations except the one recited in claim 11. However, Novak discloses the intensity of the visually

distinguishable overlay being varied in dependence on said measure ("a main window (fig. 5-500) that has an overlay button (fig. 5-570) and a scroll function for controlling the intensities (fig 5-520, 525)").

Avinash and Novak are combinable because both are pertinent to the area of image processing. By using the main window having an overlay button and scroll function of the intensities of Novak in Avinash's invention will add greater efficiency and convenience for the user to interact easily with rendering the measurement of the segmented object .Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the main window having an overlay button and scroll function of the intensities of Novak in Avinash's invention to yield the predictable results of the user to interact easily with rendering the measurement of the segmented object .

10. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avinash et al. (2004/0017935) in view of Ditt et al. (US 7,110,616).

Regarding claim 12, Avinash discloses all the previous claim limitations except the one recited in claim 12. However, Ditt discloses the grey-level of the visually distinguishable overlay being varied in dependence on said measure ("one or more gray value ranges can be selected by user-controlled highlighting of one or more markings on the monitor as well as for generating the fusion image with the aid of the selected gray-value ranges (abstract)").

Avinash and Ditt are combinable because both are pertinent to the area of image processing. By using the user friendly controller of selecting the gray value ranges of Ditt in Avinash's invention will add greater efficiency and convenience for user to generate a fusion image. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the user friendly controller of selecting the gray value ranges of Ditt in Avinash's invention to yield the predictable results of generating a fusion image.

11. Claim 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Avinash et al. (2004/0017935) in view of Hsu et al. (US 6,016,442).

Regarding claims 14-16, Avinash discloses all the previous claim limitations except the one recited in claim 14. However, Hsu discloses the visually distinguishable overlay comprising a symbol having a property which depends on the value of said measure at a selected display point ("a medical device system and method of plotting symbols representing complexes of selected arrhythmic events that are grouped together within a defined boundary and displayed on an interactive display (fig. 10-600; abstract; col. 3, lines 4-7). The defined boundary is draw by the user on the interactive display screen (col.3, lines 8-9). Moreover, the user can select one of the distinct symbols representing at least one arrhythmic episode on the interactive screen (col. 3, lines 37-39).").

Avinash and Hsu are combinable because both are pertinent to the area of image processing. By adding the method of plotting symbols representing complexes of

selected arrhythmic events that are grouped together within a defined boundary and displayed on an interactive display of Hsu in Avinash's invention will add greater efficiency and convenience for the user to quickly assess and interpret the data displayed on the interactive screen. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add plotting the symbols of Hsu in Avinash's invention to yield the predictable results of the user to quickly assess and interpret the data displayed on the interactive screen.

Regarding claim 15, Hsu further discloses the symbol being one of a circle and an error bar whose size depends on the value of said measure at a selected display point ("a medical device system and method of plotting symbols representing complexes of selected arrhythmic events that are grouped together within a defined boundary and displayed on an interactive display (fig. 10-600; abstract; col. 3, lines 4-7). The defined boundary is draw by the user on the interactive display screen (col.3, lines 8-9).").

Regarding claim 16, Hsu further discloses the symbol being displayed at any time only at a single selected display point ("the user can select one of the distinct symbols representing at least one arrhythmic episode on the interactive screen (col. 3, lines 37-39).").

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN Wahnkyyo LEE whose telephone number is (571)272-9554. The examiner can normally be reached on Monday - Friday (Alt.) 7:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

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Customer Service Representative or access to the automated information system, call
800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/CHARLES KIM/
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